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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,114	02/20/2001	Pin-Shyne Chin	TS00-338	4177

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EXAMINER

BEREZNY, NEAL

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/785,114

Applicant(s)

CHIN ET AL.

Examiner

Neal Berezny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 9-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Election/Restrictions***

1. Examiner acknowledges applicant's election, with traverse, of the Group I invention, claims 1-8, being drawn to a method of making an SRAM device. Applicant traverses the restriction on the assertion that since the method claims are drawn to a method of making an SRAM device and the device claims are drawn to an SRAM device, then the field of search must be the same. Applicant ~~provides nothing more to substantiate such a generalized assertion. Applicant's attention is directed~~ to MPEP 806.05(f), where clearly provisions are made to restrict method and device inventions.

Applicant's generalized argument is directed toward the MPEP and not relevant to the specifics of the examiner's restriction. Applicant further asserts that the examiner's suggestion that "the product can be made by another materially different process" by diffusing dopant rather than implanting, as being "very speculative". Applicant fails to substantiate such an assertion with any specifics. The method of diffusing dopants has been well known and practiced for decades in the semiconductor industry and can hardly be construed as "speculative". Finally, applicant's request that the examiner deviate from the MPEP and standard PTO practice and withdraw the restriction, in order to save applicant money, is highly inappropriate. The restriction is now FINAL and the Group II invention, claims 9-14, will not be considered.

Specification

2. The disclosure is objected to because of the following informalities:

A. Page 10, lines 4-6, it is stated that the resist pattern blocks the P+ implant into the **bit line** region. This appears to be in contrast with fig.3 and 4, el.60.

B. Page 12, lines 9-10, it is stated that the second bit line region is **lightly doped**. This appears to contradict page 10, lines 8-14, in the same specifications.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 7 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 7 has the bit line region and the cell node region having different dopant concentrations, but the specifications teaches that the two regions are implanted in the same step. It is unclear how the same implant step can produce two different concentrations in two different regions.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1, at the end of step b, the limitation "said cell node region" appears to be incomplete. It is not clear what this limitation is meant to convey. Is the cell node region also adjacent to the bitline region?

7. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 7 has the bit line region and the cell node region having different dopant concentrations, but the specifications and claim 1 teach that the two regions are implanted in the same step. It is unclear how the same implant step can produce two different concentrations in two different regions.

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Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. ~~Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gilgen et al.~~

~~(5,134,085). Gilgen teaches a method of fabrication of a 1T Static Random Access~~
Memory (SRAM), comprising the steps of forming a word line structure and a capacitor plate structure on a substrate; fig.16, el.101, 161, a capacitor plate structure comprised of a capacitor dielectric on said substrate, el.152, col.8, ln.34-38, and a conductive plate layer on said capacitor dielectric; el.161, said capacitor plate structure overlying a plate region of said substrate; el.151, said plate region and said conductive plate layer acting as plates of a capacitor; implanting ions of a first conductivity type into said substrate forming a cell node region in said substrate between said word line structure and said capacitor plate structure; and forming a first bit line region in said substrate adjacent to said word line structure, el.112, said cell node region; forming spacers on the sidewalls of said word line structure and said capacitor plate structure; el.171, 161, forming a mask pattern over said cell node; el.154, implanting ions of a first conductivity type into said substrate to form a second bitline region; Fig.17, and not implanting ions into said cell node; removing the mask pattern; col.8, ln.59-65, forming a dielectric layer

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over said substrate; fig. 19, el. 192, and forming a bitline contact to said second bitline region, fig. 20, el. 201. Gilgen does not teach performing the first implant step after the formation of the wordline and capacitor plate structures, but rather before their completions. It would be obvious to one of ordinary skill in the art at the time of the invention to modify Gilgen to spread out the capacitor structure and separate it from the cell node region and perform the first implant later in order to reduce leakage currents. Gilgen's structure is designed to use less area, but at the expense of higher leakage currents and it would be obvious to employ either design based on the demands placed on the device.

10. Claims 2, 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gilgen as applied to claim 1 above, and further in view of Mandelman et al. (6,274,441). Gilgen does not specifically state that the second bit line region 60 preferably has an impurity concentration greater than the cell node region 40 by at least a factor of 10, nor wherein said second bitline region has a concentration between $1E20$ and $1E21$ atom/cc, nor wherein said first bit line region has a p-type doping and has an impurity concentration between $1E18$ and $1E19$ Atoms/cc, said second bit line region has a p-type doping and has a impurity concentration between $1E20$ and $1E21$ atoms/cc and said cell node region has a p-type doping and has an impurity concentration between $1E18$ and $1E19$ atom/cc. Mandelman teaches that the second bit line region preferably has an impurity concentration greater than the cell node region 40 by at least a factor of 10, see claim 18 and col.3, ln.43-51, wherein said second bitline region has a concentration between $1E20$ and $1E21$ atom/cc, claim 18, wherein said first bit line region has a p-type doping and has an impurity concentration between $1E18$ and $1E19$ Atoms/cc, col.3, ln.43-51, said second bit line region has a p-type doping and has a impurity concentration between $1E20$ and $1E21$ atoms/cc and said cell node region has a p-type doping and has an impurity concentration between $1E18$ and $1E19$ atom/cc. It would be obvious to one of ordinary skill in the art at the time of the invention to employ well known

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dopant concentration analysis to determine these dopant profiles to achieve the desired device characteristics, so as to increase switching speeds, lower resistance, and improve device performance. Further it is well known in the art to interchange N-type devices for P-type devices and visa versa. It would be obvious to one of ordinary skill in the art at the time of the invention to switch dopant types to increase the latitude of device characteristics and performance features.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gilgen and

~~Mandelman as applied to claims 1-2, 5-7 above, and further in view of Chi (6,262,447). Gilgen and~~

Mandelman appear not to specifically state that the substrate is doped with an n-type impurity; having an impurity concentration between $1E17$ and $1E18$ atoms/cc, nor that the substrate is p doped and has a n-well under said word line structure and said capacitor plate structure, said N-well is doped with a second conductivity type impurity; second conductivity type impurity is an n-type impurity; said n-well has an impurity concentration between $1E17$ and $1E18$ atoms/cc. Chi teaches forming a P-well for an N-type device, with an impurity concentration between $1E17$ and $1E18$ atoms/cc, col.2, ln.60-62. It would be obvious to one of ordinary skill in the art at the time of the invention to employ well known dopant concentration analysis to determine these dopant profiles to achieve the desired device characteristics, so as to increase switching speeds, lower resistance, and improve device performance. Further it is well known in the art to interchange N-type devices for P-type devices and visa versa. It would be obvious to one of ordinary skill in the art at the time of the invention to switch dopant types to increase the latitude of device characteristics and performance features.

11. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gilgen, Mandelman, and Chi as applied to claims 1-7 above, and further in view of Wolf, vol.2, p.589. Gilgen, Mandelman, and Chi do not appear to specifically state that the cell node region and said first bit line region do not intersect. Wolf teaches that the cell node region and said first bit line region do not intersect, p.589, fig.8-10 (b&c). It would be obvious to one of ordinary skill in the art at the time of the invention to

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form the cell node region and the first bit line region so as not to intersect, in order to reduce leakage currents between the regions, thereby increasing performance.

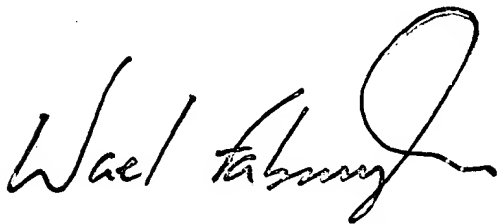
CONCLUSION

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neal Berezny whose telephone number is (703) 305-1481. The examiner can normally be reached on Monday to Friday from 9:00 to 5:30.

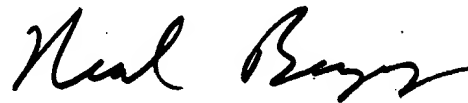
~~If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor,~~

Wael Fahmy, can be reached at (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800



7/15/02

Neal Berezny

Patent Examiner

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